

Data Collection Activity - Modeling Exponential Growth

In this activity we are going to model "exponential growth" using a cup and M&M's.

Directions:

1. Dump the M&M's out on a piece of paper on your table.
2. Place two M&M's into your cup and record a "2" in the chart below under "CUP # 0" (which represents the initial amount).

CUP #	0	1	2	3	4	5	6
My Total							
Class Total							

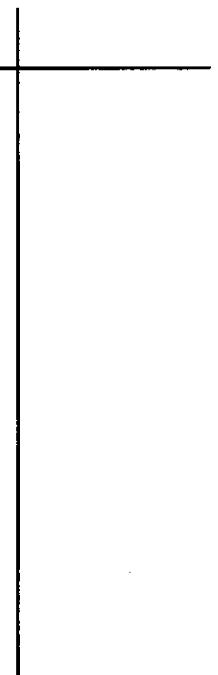
3. Here are the directions for completing the chart above.

- Shake up the M&M's that are in the cup and then dump them out again.
- Count the number of M&M's with the "M" facing up. (Look carefully at the yellow ones!)
- For every M&M that is facing up, add one M&M to the cup.
- Record the number of M&M's that are now in the cup under "CUP #1".
- Repeat these directions until you do not have enough M&M's to put in the cup, but record this number in the chart.

4. When you are finished collecting and recording your data, put your results in the chart in the front of the class to calculate the "Class Total" data.

Analyzing the Data

5. Enter the data (that was discussed in class) in L1 (CUP #) and L2 (Class Total) of your calculator and create a scatterplot. Show a sketch of the scatterplot below.



6. The graph of the data shows a relationship between the CUP # and the Class Total of the amount of M&M's, and is an example of an **exponential growth** problem. So, we need to find a function in the form:

$$y = a \cdot b^x$$

7. To find the specific function that models the data, we need to find values for "a" and "b".

The value of "a" represents the "vertical stretch". The first data point should help you determine this value.

a = _____

Let's find the value of "b" two different ways.

- a. Let's try to find a good value of "b" by "trial and error". On your calculator, enter a function in the form $y = a \cdot b^x$, but put the value of "a" that we found above into the equation and make a guess for the value of "b". Keep adjusting the "b value" until you get a good fit!

By "trial and error", the function that fits the data is _____

- b. Now let's try to find the "b value" using algebra. Select another ordered pair (that is not close to the first value) from your scatterplot, substitute the values of this point for x and y into the exponential equation (along with the value of "a"), and solve for "b". Show your work below.
Then graph it to see how it fits!

Using algebra, the function that fits the data is _____

8. Finally, let's see if we can answer some questions about the "real-world" meaning of the values of "a" and "b". (Use the exponential equation you found algebraically, not the "trial and error equation".) Where does the value of "a" come from?

a: _____

Finally, think about the value of "b". (Hint: It represents a percent. A percent of what?)

b: _____